REMARKS

Initial remarks:

Applicant initially notes with appreciation the Examiner's indication in the July 9 Office Action that Claims 9 and 16 would be allowable if appropriately rewritten. In this regard, new Claims 23 and 24 include the limitations of dependent Claims 9 and 16, respectively, rewritten in independent form and are therefore believed to be in condition for allowance and such disposition is respectfully requested.

Claim rejections under 35 U.S.C. § 112, second paragraph:

In the July 9 Office Action, the Examiner rejected Claim 13 under 35 U.S.C. § 112, second paragraph contending that the limitation "the high gain optical feedback modulator" therein lacked sufficient antecedent basis. The amendment to Claim 13 presented herein obviates the antecedent basis issue and Applicant respectfully submits that Claim 13 is in condition for allowance.

Claim rejections under 35 U.S.C. § 102(b) and/or 35 U.S.C. § 103(a):

In the July 9 Office Action, the Examiner rejected independent Claims 1, 8, 14 and 21 under 35 U.S.C. §102(b) and/or 35 U.S.C. § 103(a) contending that such claims were anticipated by U.S. Patent No. 5,548,433 to Smith or U.S. Patent No. 6,337,755 to Cao or were obvious based on Smith in view of U.S. Patent No. 5,781,327 to Brock or Cao in view of Brock.

Initially Applicant notes that rejection of any claims in the present application under 35 U.S.C. § 102(b) based on Cao is not proper and should be withdrawn. In this regard, the present application was filed on September 15, 2000, but Cao was not patented until January 8, 2002, and thus is not an appropriate § 102(b) reference with respect to the present application. Nevertheless, Applicant will address the substantive deficiencies of Cao in the present remarks, and reserves the right to overcome a subsequent rejection by the Examiner using Cao by filing an appropriate affidavit under 37 C.F.R. § 1.131.

Applicant respectfully disagrees that the limitations of independent Claims 1, 8, 14 and 21 as currently presented are disclosed in Smith or Cao or are obvious based on Smith or Cao in combination with Brock, and respectfully submits that independent Claims 1, 8, 14 and 21, and all claims depending directly or indirectly therefrom are in condition for allowance. As summarized more fully below, in each of independent claims 1, 8, 14 and 21, an input light beam

is combined with an optical feedback signal and the combined optical signal is modulated in response to an electrical signal to generate a high modulation depth optical signal and the optical feedback signal.

More particularly, independent Claim 1 is directed to a high efficiency optical feedback modulator operable to produce a high modulation depth optical signal comprising an optical modulator having a first and a second optical input and a first and a second optical output and an optical feedback system coupling the second optical output to the second optical input and operable to communicate an optical feedback signal from the second optical output to the second optical input. The first optical input is operable to receive an input light beam and the optical modulator operates to modulate the input light beam and the optical feedback signal in response to an electrical signal to output the high modulation depth optical signal from the first optical output.

Independent Claim 8 is directed to a high efficiency optical feedback modulator comprising an optical modulator having at least two optical inputs and at least two optical outputs, with an input light beam being receivable on at least one of the optical inputs, and an optical feedback system configured to feed an optical feedback signal from at least one of the optical outputs to at least one of the optical inputs. The optical modulator includes a first optical coupler wherein the input light beam is combined with the optical feedback signal to produce first and second optical signals, is operable to modulate the first and second optical signals in response to an electrical signal to produce first and second phase shifted optical signals, and includes a second optical coupler wherein the first phase shifted optical signal is combined with the second phased shifted optical signal to produce the optical feedback signal and a high modulation depth optical signal.

Independent Claim 14 is directed to a fiber optic system comprising a high efficiency optical feedback modulator operable to receive an electronic input signal, an optic fiber coupled to an optical output of the optical modulator and operable to communicate a high modulation depth optical signal, and an optical receiver operable to receive the high modulation depth optical signal and convert the high modulation depth optical signal into an electronic output signal. The high efficiency optical feedback modulator includes an optical modulator having at least two optical inputs and at least two optical outputs and an optical feedback system feeding an optical feedback signal from at least one of the optical outputs to at least one of the optical inputs. The optical modulator is operable to receive an input light beam on at least one of the

optical inputs, combine the optical feedback signal with the input light beam, and modulate the combined input light beam and optical feedback signal in response to the electronic input signal to produce the high modulation depth optical signal.

Independent Claim 21 is directed to a method for producing a high modulation depth optical signal comprising the steps of communicating an input light beam to a first optical input of an optical modulator, communicating an optical feedback signal from a second optical output of the optical modulator to a second optical input of the optical modulator, coupling the input light beam with the optical feedback signal to produce a first and a second optical signal, intensity modulating at least one of the optical signals with an electronic input signal to produce a first and a second phase shift optical signal, and coupling the phase shift optical signals to produce the high modulation depth optical signal and the optical feedback signal.

Smith and Cao do not disclose and, in combination with Brock, do not render obvious to one skilled in the art the various combinations of limitations required by independent Claims 1, 8, 14 and 21 because both Smith and Cao fail to teach combining an input light beam with an optical feedback signal and modulating the combined optical signal in response to an electrical signal to generate a high modulation depth optical signal and the optical feedback signal. In this regard, Smith is directed to a system for recovering a clock signal from an optically encoded signal intended to overcome perceived deficiencies with electro-optical clock recovery systems. See Smith Col. 1, lines 5-8 and 19-35. A review of Smith indicates that, unlike the apparatuses and method of Claims 1, 8, 14 and 21, the use of an electrical input signal to modulate an optical signal is simply not disclosed in Smith. Rather, Smith's optical clock recovery system is an all-optical system incorporating a laser that is mode locked via a modulator driven by an optical stream of data. See Smith Col. 1, lines 55-67. Thus, Smith specifically teaches away from the use of electrical stimulation to modulate an optical signal.

Cao is directed to synchronous polarization independent all-optical regenerators including polarization independent modulators. See Cao Col. 1, lines 65-67. However, unlike the true optical feedback signal incorporated in the apparatuses and method of Claims 1, 8, 14 and 21, the polarization independent amplitude/phase modulator 220 of Cao shown in Fig. 2 thereof simply employs series modulation of an optical input signal. In this regard, Cao couples the output of the first Lithium Niobate waveguide 237 via first polarization maintaining optical fiber 242, cross splice/delay line device 240 and second polarization maintaining optical fiber 244 to the input of the

second Lithium Niobate waveguide 238. See Cao, Fig. 2 and Col. 4, line 48 through Col. 5, line 9. Thus, an optical signal input to the polarization independent amplitude/phase modulator 220 of Cao traverses the first and second Lithium Niobate waveguides 237 and 238 in a series fashion and is output on optical fiber 246 without ever being combined with an optical feedback signal taken from the outputs of either of the first and second Lithium Niobate waveguides 237 and 238.

Based upon the foregoing, pending independent Claims 1, 8, 14 and 21, as well as their corresponding dependent claims are allowable over Smith or Cao, either alone or in combination with the other references. There is therefore no need to separately address the patentability of each dependent claim and/or the Examiner's interpretation in relation to any of the dependent claims or any of the references of record in relation thereto.

Conclusion:

In view of the foregoing, Applicant believes that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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